COURSE DESCRIPTION CARD - SYLLABUS

Course name

Data Mining in industrial practice

Course

Field of study

Management and Production Engineering

Year/Semester

2/4

Area of study (specialization)

Computerisation in Production

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

English

Form of study

part-time

Requirements

elective

Number of hours

Lecture

8

Laboratory classes

8

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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Responsible for the course/lecturer:

Prerequisites

The student should have knowledge in the field of modeling production processes in order to support the building of useful knowledge (know-how). Is able to define the importance of databases and database systems in today's era of computerization.

Course objective

Understanding selected methods of obtaining data in manufacturing companies including automatic, semi-automatic and manual sources (data acquisition issues). The use of selected data mining methods to search for hidden patterns and regularities in data, and their use for ongoing evaluation and control of processes.

Course-related learning outcomes

Knowledge

The student has basic knowledge in the field of architecture, functionality and usefulness of databases and database systems.

Skills

Student is able to operate a Opem Database System.

Social competences

he student is aware of the importance of production data processing, including IT management systems in modern enterprises, and understands the need to have both managerial and engineering knowledge in the field of production management using computer systems used to support managementand improving production.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

pass consisting of closed and open-ended questions scored on a 0-6 scale. The examination pass mark is 55%. The student may take the exam after passing the laboratory, in special cases before passing the laboratory, if the teacher finds that the student has a chance to pass the subject positively. Discussion of exam results. The exam is conducted at the end of the semester.

Laboratory:

laboratory pass based on tasks performed during the laboratory and the final task. The student must obtain a positive assessment of the tasks completed.

Programme content

Lecture:

1. Definition of Data Mining, basic tasks of DM.
2. PPC and CAx connections - huge amount of generated data.
3. Data acquisition in production plants.
4. Preparation of data for modeling.
5. Methods for analyzing production data:
• Classic analyzes (intuitive and comparative)
• Indirect analysis (Data Analysis Explorer, EDA)
• Advanced analyzes (SPC, DM methods)
6. Methods and algorithms operating on historical data.
7. The use of selected models to discover useful knowledge (examples of tools for implementing DATA MINING).

Laboratory:

1. Production data acquisition in the CAQ (Computer Aided Quality) sample system. Preparation of data for modeling.
2. Performing basic statistical analyzes and extension analyzes for selected production data.

3. Use of historical production data - modeling of production processes.
4. Example of control of production processes using the proprietary SCADA system, with SPC elements.

Teaching methods

Lecture:
Multimedia presentation using a projector. Additional examples are drawn on the board. Solving tasks. Discussion with the group.

Laboratory:
Work on computer workstations and solving tasks in Excel, STATISTICA and WEKA, ongoing consultations and explanations in the group forum using the board.

Bibliography

Basic

1. Larose T., Discovering knowledge from data. Introduction to data mining. Ed. Naukowe PWN, Warsaw 2006.
2. Wright P., Knowledge Discovery in Database: Tools and Techniques, 1998.
3. Wieczerzycki W., Databases, ed. PFE, 1994.

Additional

1. Hand D., MannilaH., SmythP., Data exploration, WNT, Warsaw 2005.
2. Kisielewicz A., Artificial intelligence and logic. Summary of the scientific undertaking, WNT, Warsaw 2011.
3. Sika R., Ignaszak Z., Assurance Quality in the foundry industry. Acquisition and preliminary development of heterogeneous data for the needs of Data Mining systems on the example of the foundry industry, Archives of Machine Technology and Automation, Poznań 2009, Vol.29, Issue 1/2009, pp. 57-71.
4. Sika R., Ignaszak Z., Data acquisition in modeling using neural networks and decision trees, Archives of Foundry Engineering, Gliwice-Wrocław, 2011, Vol.1, Issue 2/2011, pp. 112-123.
5. Ignaszak Z., Sika R., Specificity of SPC procedures application in foundry in aspect of Data Acquisition and Data Exploration, Archives of Foundry Engineering, Cedzyna-Wrocław, 2012, Vol.12, Issue 4/2012, pp. 65-70.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	16	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	34	1,0

[1] delete or add other activities as appropriate